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ABSTRACT

Discusses how David R. Kolb's methodology of identifying four types of student learning styles can be helpful in teaching introductory economics and gives two examples of how this is being done at Hazard Community College (Kentucky). Includes an appendix designed to present a step-by-step process for teachers using the Kolb method for the first time. Step one determines each student's preferred learning style. This step of the process includes having students complete the 12-item learning-style inventory. Step two looks at learning styles and college majors. Step three identifies the types of learning activities that work best with the four learning styles. Step four presents each student with the syllabus and contract defining the work to be completed in the course. Step five is tweaking, where the goal is for the teacher to finish the course with no significant difference among the four learning-style group scores. Step six looks at who's who in the funnel of teaching and learning of economics. The key here is that all four of the learning styles (converger, diverger, assimilator, and accommodator) are represented in the general education mix, which funnels assimilators into the economics major and/or graduate school which then produces the next group of economics professors who learn best in one mode. Contains 15 references. (VWC)

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Using Students Learning Styles To Improve College Instruction

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Know Your Student's Learning Style: The Missing Link in the Lecture V. Active Learning Issue

By Richard Crowe*

While economist Robert Solow and Milton Friedman lead the debate over the existence of a natural unemployment rate, those of us teaching the introductory economics courses appear to take it for granted that there is a natural rate of failure for those courses of about 30 percent. My intent here is not to dissuade economics teachers from keeping grade inflation in check but rather to point out the loss in human capital that occurs from our ability to successfully teach only 70 percent of the introductory students enrolled in our classes.

If teachers were told before the first day of class that among their students were a fraction of semi-mute, legally blind, hearing impaired, and some able bodied individuals they would surely create strategies designed to improve communications and understanding for the benefit of all the students enrolled in their classes. If teachers did not adjust to fit the needs of their students we would rationally expect them to have a high failure rate while passing another large fraction of the class who although earning enough points to pass the class would admit that they did not understand the material, which is exactly what we have now in the teaching of introductory economics.

I. Struggling to Improve Teaching

My efforts at improving the teaching of introductory economics began with a survey of economist in Kentucky which produced the predictable conclusion that the great majority of teachers (79 percent) used only lecture to present material to students. When lecture plus a term paper was considered the percentage of teachers grew to 85 percent (1992).

My next efforts were involved with seeking specific classroom techniques that could improve on the lecture only methodology. Howard Cochran and I (1998) found that economics teaching could be improved marginally by (1) using the Test of Understanding College Economics (TUCE) pre-and post-test results as a grade in the class (not recommended by the authors[1]); (2) making intensive use of a study guide, (3) giving a comprehensive final exam, (4) making intensive use of homework, (5) making intensive use of readings and handouts, and (6) using class time for either the student or teacher to respond to questions. The total of these efforts improved TUCE scores from an average of 15.51 to an average of 18.57 (about a 20 percent improvement).

The problem with adding these methods to the lecture approach was in knowing how much to add and how often to add them. We learned that each method had a point of diminishing returns that was not the same for all students.

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[1] Conversation with Phillip Saunders, editor.

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Eight years earlier, David R. Kolb (1984) created a tool to distinguish differences among four types of student learning styles at Case-Western Reserve University. Among them were "convergers" who were good at problem solving and technical tasks; "divergers" who were good at observing, brainstorming, and gathering information; "assimilators" who were good at putting information into concise logical form; and "accommodators" who learned best by hands-on experience, acting on gut feelings, and/or relying more on people for information than technical analysis. Economist, tend to fall into the assimilator learning style where they find it more important that a theory have logical soundness than practical value. This information correlates strongly with the findings of the Myers/Briggs type indicator, a personality inventory which has determined that most economists fall into the INTJ rating, representing about 1.5 percent of the world population according to Phillip Saunders (1994).

Assuming there is validity in these findings, the problem of improving the teaching of economics in the introductory courses becomes clearer. It has not been a problem of lecture dominated teaching driving out 30 percent of our students (at the same time about half our classes did not understand the material but passed the course (anyway). The weakness in teaching economics now appears to be a matter of "professors teaching the way they were taught," which has proven to be successful with a handful of students who then become the next group of teachers to graduate into the system. This has continued to repeat itself because as we teach beginning students, almost all of who are required to take our courses, the classes have remained full.[2] With full classes, we assume that professors have been successful at teaching students qualified to be in their classes resulting in a better informed public. If, however, students are not effectively learning the principles of economics, how can they practice our important concepts and what will be the loss to society in human capital?

II. Integrating Student Learning Style Information into College Teaching of Economics

The purpose of this paper is to discuss how David R. Kolb's methodology of indentifying four types of student learning styles can be helpful in teaching introductory economics and to give two examples of how this is being done at Hazard Community College.

On the first day of class, students complete Kolb's 12 item four answer (1-4) forced choice instrument. Students then total their scores by columns (CE, RO, AC, and AE scores) and plot them vertically and horizontally on a circular graph (with cross hairs) to depict tendencies of balance and/or the wide differences students sometimes have in their preferred learning style. Then students plot their combined AC-CE score and their combined AE-RO score on a grid sectioned into four equal parts. By connecting their scores at a right angle they identify their preferred learning style eg.," diverger," "converger," "assimmilator," or "accommodator." At this point the teacher will know how many different

[2] Actually, economics classes have remained full because they are a compliment good to the business major according to William Becker (1996).

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types of learners s/he has in their class and each student will have a better idea of how they should study for any class, including economics.

At Hazard Community College, I[3] begin the first class meeting by having the students write a paragraph or two explaining how they learn best. Then I ask the students to complete the three page learning style inventory. When finished the students compare their self description to the results of the Kolb Inventory.

The Tweaking Approach

Under the tweaking approach, all students complete the same tests and active learning projects in class. They also hear the same lectures and complete the same homework assignments as their fellow students. Each student is grouped into one of the four learning styles discussed earlier so that when a major portion of the course has been completed (such as midterm exams) I can determine a group score for each learning style. I measure the groups score against the other group scores and find the standard deviation. Where a difference exists, greater than the standard deviation, I then use more of the preferred learning techniques for the low scoring groups.[4] My goal is to finish the course with no significant difference among the four learning style group scores.

This, of course, puts added pressure on the teacher to track the output of learning in class and then to prescribe teaching methods to which all students can perform well.

The Contract Method

The second method used at Hazard Community College allows students to have more choice in how the class is taught. Under the contract approach each student determines which type of learner s/he is and provides the information to me on a contract form provided as part of the class syllabus. The student also indicates which teaching techniques work best with their learning style. Additionally, the contract recognizes the contributions of Howard Gardner (1996) who identified seven types of intelligence (linguistic, logical-mathematical, bodily-kinesthetic, spatial, musical, interpersonal, and intrapersonal). Each student is asked to share any special talents s/he has eg., musical, computer, people skills. The syllabus provides a listing of learning activities each student may chose from to complete the course requirements. However, all students must complete a comprehensive take home final exam to summarize and apply the material taught that semester.[5] Students may complete a portfolio of news items and show the expected impact each will have on the circular flow and/or production possibility frontier for these weekly articles. Students may also choose tasks from among writing papers, conducting oral histories, or completing film projects. In addition, each student is required to make a presentation in class which is listed in the contract along with the grade

[3] I am the only economics teacher at HCC. I teach sophomores in an average class size of 25. Our student's average age is 26.

[4] See form in appendix that matches teaching techniques to learning styles.

[5] I should add here that I sit down with each student submitting a take home midterm or final exam and we grade the test together. This increases the time for each student to ask or answer questions. It doesn't take any longer to grade this way (for me) and it creates more teachable moments.

sought, number of absences, and the times the student will conference with the teacher that term. With this approach, the student is given the information about how s/he learns best and a menu of activities from which the student can do well based upon their learning style and special talents or interest. Under this approach the student is responsible for completing an array of tasks that appeals to them for the sake of improved learning or because it is something they think they will enjoy.

Teacher and student then agree on which tasks the student will be responsible for during the course. The tasks should reflect the learning style findings and any special skills or talents the student possesses. I want to build an interest and understanding of basic economics from the strengths the student already possesses. It may be that no two students in the class will complete an identical list of tasks during the term.

III. Conclusions

Many teachers of introductory economics have questioned the effectiveness of lecturing to students as the only method of communicating class material. Others have tried some form of active learning as another mode of communicating material to students. The question then becomes, "how much do we do besides lecture and how often do we do it?" This paper recommends using Kolb's Student Learning Style Inventory to access the type of learners enrolled in each introductory class then prescribing learning tasks that fit the needs of the student each term. Once the teacher knows what type of student learner s/he has the teacher can (1) measure the group results of his or her efforts and where there is an uneven rate of learning the teacher may tweak the array of presentations till there is no significant difference among the group scores or (2) students may be provided a variety of learning opportunities from which they choose those most compatible with their learning styles. Either technique will improve learning in small introductory economics classes.[6]

Professors teaching large class sections should use the Kolb approach to present economic concepts in four approaches, each one vital to a particular learning style. In this way, each student will be taught by their best learning style 25 percent of the time and will be reinforced by other learning styles 75 percent of the time.[7]

[6] In the most quoted research study using Kolb's techniques, Stice (1987) was able to increase student retention from 20 percent to 90 percent.

[7] See Step Three in the Appendix.

Appendix

This Appendix was designed to present a step-by-step process for teachers using the Kolb method for the first-time.

Step One: Determine each students Preferred Learning Style

Step Two: Look at Learning Styles and College Majors

Step Three: Identify the types of learning activities that work best with the four learning styles.

Step Four: Present each student with a syllabus and contract defining the work to be completed in the course.

Step Five: Tweaking

Step Six: Who's Who in the Teaching and Learning of Economics

STEP ONE

Determine Each Students Preferred Learning Style

1. Have each student write a one or two paragraph description of how they learn new material.

2. Have each student complete the 12 item learning style inventory by giving four numbered responses for each question and then summing the scores into four boxes at the bottom of the page.

3. Students then plot their boxed scores on the cycle of learning page by AE, CE, RO and AC scores (they should circle the appropriate score on the form) and finally connect the slots in a circular pattern.

4. Students should then transfer their AC, CE, AE and RO scores to the boxes at the top of the learning-style type grid page, subtract and total their AC-CE and AE-RO scores. These scores may now be plotted on the horizontal (AC-CE) and vertical (AE-RO) cross hairs on the graph. Once plotted the student should connect both points by drawing a vertical line and horizontal line into the box facing both scores. This will form a right angle as shown on the pages that follow and identify the student's preferred learning style.

5. Ask the students to read the description of their learning style on the page provided and check for general agreement with the paragraph they wrote to describe how they learn new material.

Learning-Style Inventory

You are ranking across not down. 4 = most like you 3 = second like you 2 = third most like you 1 = least like you

1. When I learn:	____ I like to deal with my feelings.	____ I like to watch and listen.	____ I like to think about ideas.	____ I like to be doing things.
2. I learn best when:	____ I trust my hunches and feelings.	____ I listen and watch carefully.	____ I rely on logical thinking.	____ I work hard to get things done.
3. When I am learning:	____ I have strong feelings and reactions.	____ I am quiet and reserved.	____ I tend to reason things out.	____ I am responsible about things.
4. I learn by:	____ feeling.	____ watching.	____ thinking.	____ doing.
5. When I learn:	____ I am open to new experiences.	____ I look at all sides of issues.	____ I like to analyze things, break them down into their parts.	____ I like to try things out.
6. When I am learning:	____ I am an intuitive person.	____ I am an observing person.	____ I am a logical person.	____ I am an active person.
7. I learn best from:	____ personal relationships.	____ observation.	____ rational theories.	____ a chance to try out and practice.
8. When I learn:	____ I feel personally involved in things.	____ I take my time before acting.	____ I like ideas and theories.	____ I like to see results from my work.
9. I learn best when:	____ I rely on my feelings.	____ I rely on my observations.	____ I rely on my ideas.	____ I can try things out for myself.
10. When I am learning:	____ I am an accepting person.	____ I am a reserved person.	____ I am a rational person.	____ I am a responsible person.
11. When I learn:	____ I get involved.	____ I like to observe.	____ I evaluate things.	____ I like to be active.
12. I learn best when:	____ I am receptive and open-minded.	____ I am careful.	____ I analyze ideas.	____ I am practical.

TOTAL the scores from each column:	☐ Column 1 (CE)	☐ Column 2 (RO)	☐ Column 3 (AC)	☐ Column 4 (AE)

Source: David L. Kolb, "Learning-Style Inventory." Boston: McBer & Company, 1985, p. 3.

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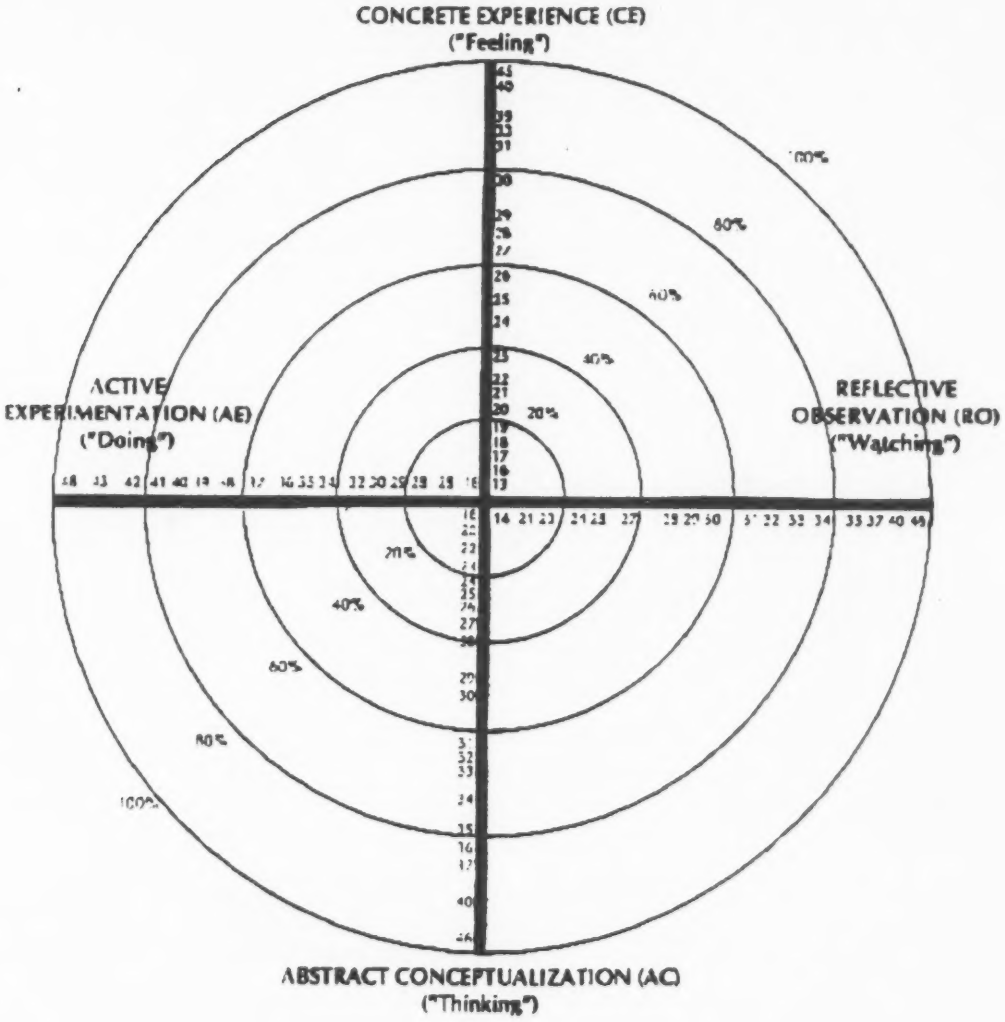
The Cycle of Learning



Source: David L. Kolb, "Learning-Style Inventory." Boston: McBer & Company, 1985, p. 4.

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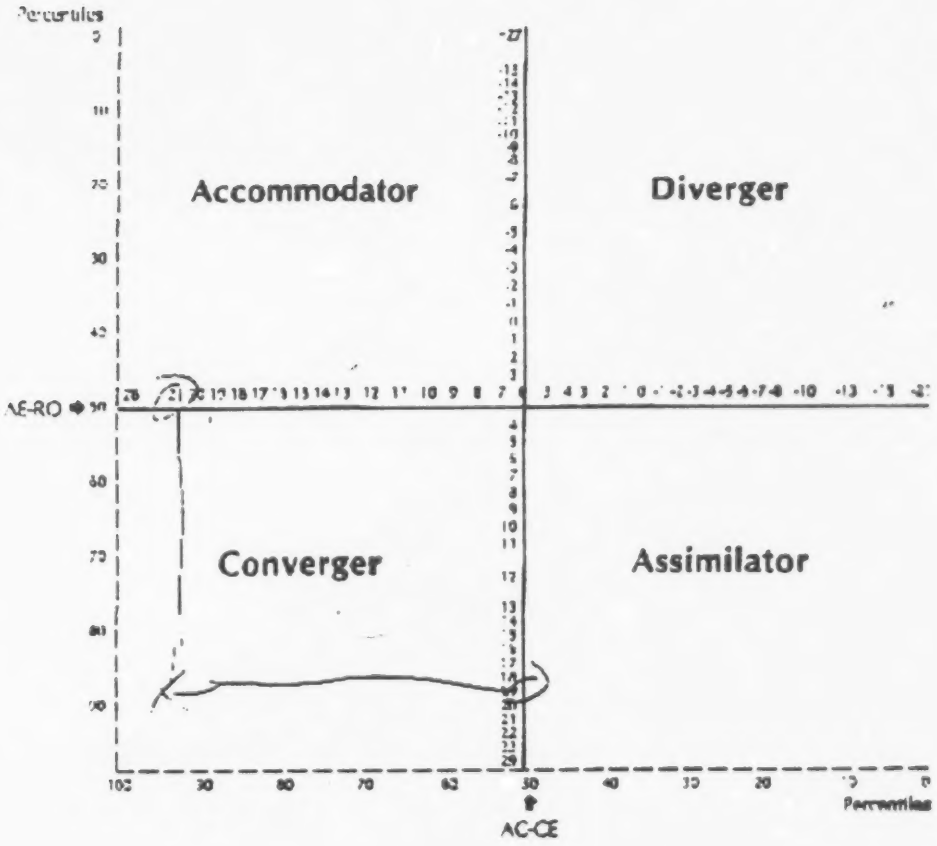
Learning-Style Type Grid

AC - CE = AC-CE AE - RO = AE-RO



Source: David L. Kolb. 'Learning-Style Inventory.' Boston: McBer & Company, 1985, p. 6.

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The Four Learning Style Types

CONVERGER -- Combines learning steps of
ABSTRACT CONCEPTUALIZATION and **ACTIVE EXPERIMENTATION**

People with this learning style are best at finding practical uses for ideas and theories. If this is your preferred learning style, you have the ability to solve problems and make decisions based on finding solutions to question or problems. You would rather deal with technical tasks and problems than with social and interpersonal issues. These learning skills are important to be effective in specialist and technology careers.

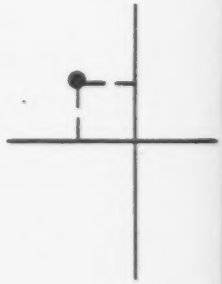
DIVERGER – Combines learning steps of
CONCRETE EXPERIENCE and **REFLECTIVE OBSERVATION**

People with this learning style are best at viewing concrete situations from many different points of view. Their approach to situations is to observe rather than take action. If this is your style, you may enjoy situations that call for generating a wide range of ideas, as in a brainstorming session. You probably have broad cultural interests and like to gather information. This imaginative ability and sensitivity to feelings is needed for effectiveness in the arts, entertainment, and service careers.

ASSIMILATOR – Combines learnings steps of
ABSTRACT CONCEPTUALIZATION and **REFLECTIVE OBSERVATION**

People with this learning style are best at understanding a wide range of information and putting it into concise, logical form. If this is your learning style, you probably are less focused on people and more interested in abstract ideas and concepts. Generally, people with this learning style find it more important that a theory have logical soundness than practical value. This learning style is important for effectiveness in information and science careers.

ACCOMMODATOR – Combines learning steps of
CONCRETE EXPERIENCE and **ACTIVE EXPERIMENTATION**



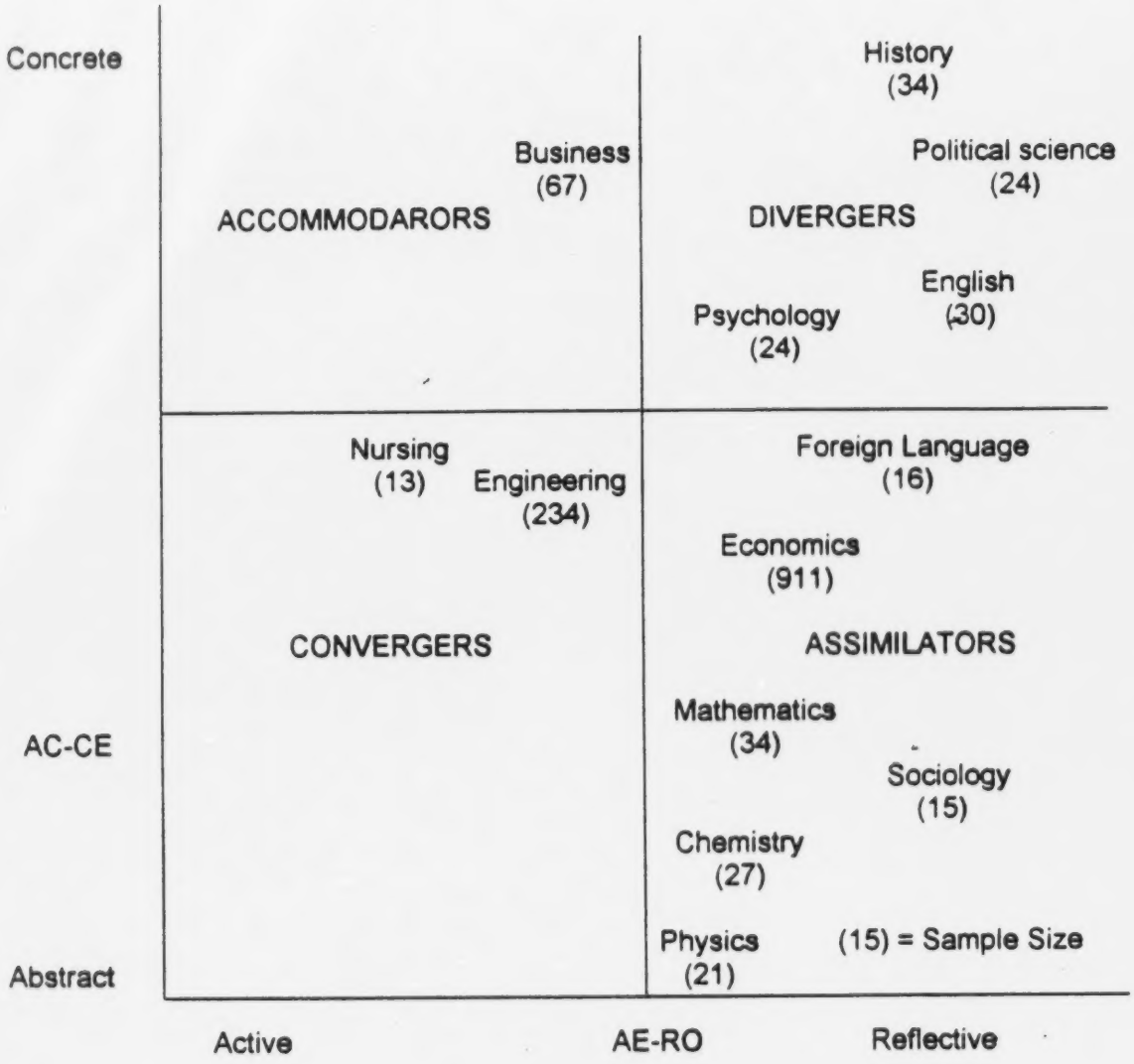
People with this learning style have the ability to learn primarily from "hand-on" experience. If this is your style, you probably enjoy carrying out plans and involving yourself in new and challenging experiences. Your tendency may be to act on "gut" feelings rather than on logical analysis. In solving problems, you may rely more heavily on people for information than on your own technical analysis. This learning style is important for effectiveness in action-oriented careers such as marketing or sales.

Source: David L. Kolb, "Learning-Style Inventory." Boston: McBer & Company, 1985, p. 7.

Step Two

Learning Styles and College Majors[8]

Learning Styles and College Majors[7]



[7](Kolb, 1984) Surveyed 800 Managers and Graduate Students.

Step Three

Kolb's Student Learning Styles Matched with Teaching Techniques that work Best for Each Group.

By Richard Crowe

Learning Style	Best Teaching Techniques
Accommodators*	chalking graphs on the sidewalks
	directed paraphrasing
	examples
	expert in class
	films
	portfolios
	readings
	role playing
	simulations
	study guides
	talk alouds
	three-step study groups
	turn abouts
Assimilators**	collaborative learning
	lecture
	mastery learning
	mnemonics
	models
	one minute papers
	pause-discuss
	projects
	proofs-theorems
	study guides
	term papers

* also known as active learners or Type I learners in the literature
** also known as reflective learners or Type II learners in the literature

Convergers***	Case studies co-op / internship field studies homework problems job shadowing lab work service learning simulations
Diverger****	cartoons four corners group discussions in class presentations journals opinionated papers panels posters student-teacher discussions

Step Four

Present each student with a course syllabus that includes a menu of optional assignments designed to fit all four student learning styles and a contract to clarify for each student what their responsibilities will be for the class, eg., number and type of assignments due, their desired grade and the learning outcomes needed to earn it, any special skills or talents the student possesses which may be utilized in the class, number of absentees allowed, and a schedule of conferences with the teacher related to the tasks to be completed in the class.

A. Richard Crowe, Professor
Office #107-F
Phone: 436-5721 X 361
Email: rcrowe@pop.uky.edu

B. Course:

ECO 201-01, Principles of Economics I (Micro), 3 hours, MWF 9:10 – 10:10
ECO 201-02, Principles of Economics I (Micro), 3 hours, TRF 11:30 – 12:30

DESCRIPTION

The study of the allocation of scarce resources from the viewpoint of individual economic units. Topics include household and firm behavior, competitive pricing of goods and resources, and monopoly power. (Credit will not be given for this course to students who have received credit in ECO 261.) Teacher's interpretation: we will study the decision making process for individuals and business concerns with regard to their use of scarce resources.

C. TEXT

1) Economics, 4th Edition, Parkin, Addison Wesley
2) Study Guide, Microeconomics (Optional)

D. OBJECTIVES

1. To teach the class in modes beneficial to all students. Hopefully there will be no significant difference between the final grades, as a group, of converger, diverger, assimilator, and accomodator learners.
2. To stimulate in students an awareness of, and a continuing interest in, important problems of economic policy. The kind of policy problems one encounters daily in the newspapers and news magazines.
3. To give students a firm grasp of the few basic principles and analytical tools they need in order to think intelligently about economic problems. Where necessary, technical theoretical detail will be sacrificed in order to obtain proficiency in the use of the basic tool kit.
4. To help students to develop good methods in thinking about economic problems. This involves specific attention to the process of orderly problem-solving, including the recognition of different values and the problem of conflicting goals.
5. To help students to learn to evaluate and use both qualitative and quantitative evidence when conflicting viewpoints and approaches are encountered.

E. METHOD OF INSTRUCTION

1. Students will learn terms, concepts, and laws through lecture.
2. Classroom activities will emphasize active learning through discussions, problem solving, and student presentations.
3. Students will demonstrate their newly developed economic knowledge by presenting a collection of economic activities gathered during the term.
4. Each student will meet with Richard Crowe twice during the semester to discuss their projects on an individual basis.

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F. CLASS SCHEDULE

Week 1 & 2 - Read chapter 1, What Is Economics? and Chapter 2, Making and Using Graphs.

Week 3 - Read Chapter 3, The Economic Problem.

Week 4 - Read Chapter 4 Demand and Supply.

Week 5 - Read Chapter 5 Elasticity.

Week 6 - Read Chapter 6 Efficiency.

Week 7 - Read Chapter 7, Markets In Action.

Week 8 - Read Chapter 8, Utility and Demand.

Week 9 - Read Chapter 9, Possibilities, Preferences, and Choices.

MIDTERM EXAM

Week 10 - Read Chapter 10, Organizing Production.

Week 11 - Read Chapter 11, Output and Costs.

Week 12 - Read Chapter 12, Competition.

Week 13 - Read Chapter 13, Monopoly.

Week 14 - Read Chapter 14, Monopolistic Competition and Oligopoly.

Week 15 - Read Chapter 19, Regulation and Antitrust Law.

Week 16 - Read Chapter 18, Market Failure and Public Choice.

Week 17 - Final Exam

G. ATTENDANCE POLICY

This course will require a great deal of your time. You should plan now so that time will be available as needed. You should be in class whenever humanely possible because missed classes will make it extremely difficult to complete all assignments.

H. EVALUATION

Each student will complete the self-evaluation provided to determine which type of learner they are. After gaining a better understanding of (A) their learning style and the (B) available course choices the student will contract for the grade they hope to receive in this class. Students earning 90% or greater (360 points) on all work assigned with less than 3 absences will receive an "A" for the course. Students earning 80% or greater (320 points) on all work assigned with less than 5 absences will receive a "B" for the course. Students earning 70% or greater (280 points) on all work assigned with less than 8 absences will receive a "C" for the course. Students earning 60% or greater (240 points) on all work assigned with less than 10 absences will receive a "D" for the course. All other students will receive an F for the class.

WORK TO BE COMPLETED

PART A. Everyone completes part A.

Comprehensive ORAL Final Exam	100 Points
Make a satisfactory oral presentation in class	(This will cost you one letter grade if not completed.)

PART B.

Students choose one of three options:

Take Home Mid Term — 100 Points

or

Write a 3 to 5 page paper on an approved topic due by midterm

or

Complete an oral history project on an economic issue due by midterm

PART C.

Students choose one of two options:

Complete an analytical paper on a major U.S. firm due on the last day of class. — 100 Points

or

Complete a video project on how a part of your local economy works.

PART D.

Students choose one of two options:

100 Points

Write four two-page essays that make recommendations for improving efficiency in the economic system due at the end of weeks 4, 8, 12, and 16.

Or

Write four two-page letters to the editor about an existing economic issue in your community.

I. NOTES

1. Students may officially withdraw with a grade of "W" up to the last class.
2. A normal class requires two hours of study for each hour of class. Plan your schedule accordingly. College is like a full-time job.
3. The teacher reserves the right to make changes in the above format as deemed necessary during the semester.
4. No smoking is permitted in the classroom.
5. Students who, as determined by the instructor, have cheated on any class work will receive a failing grade from this course.
6. Disabilities - Any student requiring individualized classroom accommodations due to a disability should schedule a conference with the Disabilities Service Office at his/her earliest convenience.

☐ Approved by Richard Crowe
_____ (Date)

CONTRACT

I completed the learning style self-evaluation on _____ (date) that determined that my primary

learning style was _____ (type). This means that I learn best by:

_____

_____
(explain)

My career goal is to become a _____(job). People tell me that I have

good skills or talents in _____ _____ (name some)

I will earn a grade of ____ in this class by:

A. Making a score of ____% on the Comprehensive take home final.

B. Making a score of ____ % on _____ (fill in) If not taking the mid-term what will be your

project? _____(write in).

C. Making a grade of ____ % on _____ (write in).

D. and by making a grade of ____ % on _____ (fill in).

Describe your project here (write in):

I will make a class presentation on my project: _____ (write in)

during week _____. I will meet with Richard Crowe two times during week

_____ and _____. I will miss class no more than _____ times.

_____ _____
Student Signature Date

Step Five

Tweaking

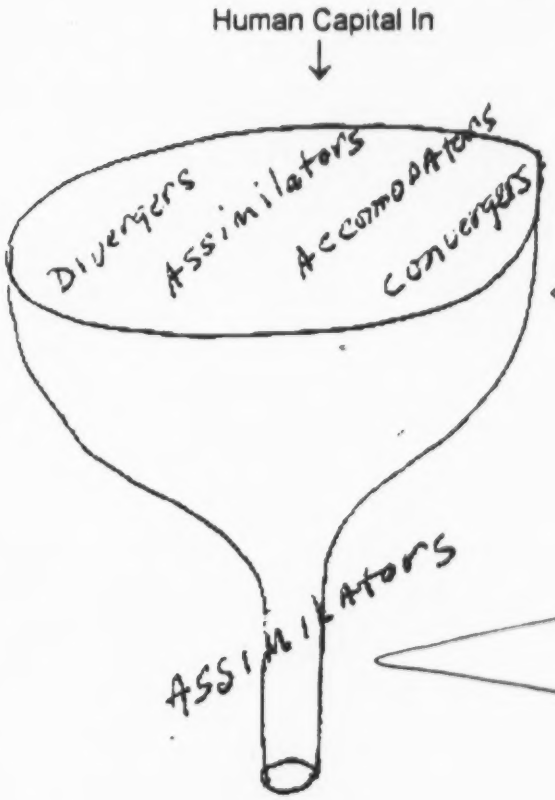
When using the Tweaking Approach the teachers measure the success of each learning style group at appropriate intervals by finding their mean score, ranking them with all four learning style groups, and finding the standard deviation. If there are no significant differences between group scores then the class should proceed with no changes. However, if there is a significant difference among the four scores then the teacher should use more of the teaching methods favored by the under performing group as the class continues. For instance, the scores below indicate no significant differences between divergers (75), assimilators (78) and the mean (77.5). However, the convergers score (84.4) was significantly higher than the mean and the accomodators score (72.5) was significantly lower than the mean indicating that the teacher should use more readings and study guide assignments, for example, and fewer case studies and lab work[9] for upcoming assignments in this class. The goal here is to use methods favorable to each of the four groups 25 percent of the time rather than using one method favorable to one group 100 percent of the time.

Groups	Midterm Grades
Accommodations	72.5
Convergers	84.4
Divergers	75.0
Assimilators	78.0
Mean	77.5
Standard deviation	4.5

[9] See Step Three.

Step Six

Who's Who in the Funnel of Teaching and Learning of Economics



The array of general education student learning styles found in a typical principles of economics class.

Type of Learning Style found for students majoring in economics.

Assimilators and INTJ'S on the Myers/Briggs Type Indicator that represent only 1.5% of the world population.

The professors of economics

KEY

All four of the learning styles are represented in the general education mix which funnels assimilators into the economics major and / or graduate school which then produces the next group of economics professors who learn best in one mode.

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